REMARKS

Applicants respectfully submit that all the claims presently on file are in condition for allowance, which action is earnestly solicited.

THE CLAIMS

CLAIM OBJECTIONS

Independent claim 1 and dependent claims 13 & 14 were objected to for containing certain formalities. Claims 1, 13, and 14 have been amended to address these formalities. No new matter has been added.

CLAIMS REJECTIONS UNDER 35 U.S.C. 112, SECOND PARAGRAPH

Claims 1-14 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Claims 1, 13, and 14 were objected to for containing certain formalities. Claims 1, 13, and 14 have been amended to address these formalities.

CLAIMS REJECTION UNDER 35 U.S.C. 103

A. The Rejection

Claims 1-14 were rejected under 35 U.S.C. 103(a) as being unpatentable over Russell (U.S. Patent No. 463,922), hereinafter referred to as "Russell," in view of McClain III (U.S. Patent No. 5,164,538), hereinafter referred to as "McClain."

Applicants respectfully traverse these rejections and submit that none of the cited references discloses the elements and features of the claims on file, whether these references are considered individually or in combination with each other. To this end, Applicants respectfully submit the following arguments:

B. Legal Standards for Obviousness

The following legal authorities set the general legal standards in support of Applicants' position of non-obviousness, with emphasis added for added clarity:

- MPEP §2143.03, "All Claim Limitations Must Be Taught or Suggested: To establish prima facie obviousness of a claimed invention, **all the claim limitations must be taught or suggested by the prior art**. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "**All words in a claim must be considered** in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)."

- MPEP §2143.01, "The Prior Art Must Suggest The Desirability Of The Claimed Invention: There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art." In re Rouffet, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998) (**The combination of the references taught every element of the claimed invention, however without a motivation to combine, a rejection based on a prima facie case of obvious was held improper**.). The level of skill in the art cannot be relied upon to provide the suggestion to combine references. Al-Site Corp. v. VSI Int'l Inc., 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999).

- "**Obviousness cannot be established** by combining the teachings of the prior art to produce the claimed invention, **absent some teaching or suggestion** supporting the combination." *In re Fine, 837 F.2d at 1075, 5 USPQ2d at 1598* (citing *ACS Hosp. Sys. v. Montefiore Hosp., 732 F.2d*

1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984)). **What a reference teaches** and whether it teaches toward or **away from the claimed invention** are questions of fact. See *Raytheon Co. v. Roper Corp., 724 F.2d 951, 960-61, 220 USPQ 592, 599-600 (Fed. Cir. 1983),* cert. denied, *469 U.S. 835, 83 L. Ed. 2d 69, 105 S. Ct. 127 (1984).* "

- "When a rejection depends on a combination of prior art references, there must be **some teaching, suggestion, or motivation** to combine the references. See *In re Geiger*, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987)." Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention **where there is some teaching, suggestion, or motivation** to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See MPEP 2143.01; In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); and In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

- "With respect to core factual findings in a determination of patentability, however, the **Board cannot simply reach conclusions based on its own understanding or experience** -- or on its assessment of what would be basic knowledge or common sense. **Rather, the Board must point to some concrete evidence in the record** in support of these findings." See In re Zurko, 258 F.3d 1379 (Fed. Cir. 2001).

- "We have noted that **evidence of a suggestion, teaching, or motivation to combine** may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved, see Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1630 (Fed. Cir. 1996), Para-Ordinance Mfg. v. SGS Imports Intern., Inc., 73 F.3d 1085, 1088, 37 USPQ2d 1237, 1240 (Fed. Cir. 1995), although "the suggestion more often comes from the teachings of the pertinent references," Rouffet, 149 F.3d at 1355, 47 USPQ2d at 1456. The range of sources available, however, does not diminish the requirement for actual evidence. That is, **the showing must be clear and particular**. See, e.g., C.R. Bard, 157 F.3d at 1352, 48 USPQ2d at 1232. **Broad conclusory statements regarding the teaching of multiple references, standing alone, are not "evidence."** E.g., McElmurry v. Arkansas Power & Light Co., 995 F.2d 1576, 1578, 27 USPQ2d 1129, 1131 (Fed. Cir. 1993) ("Mere denials and conclusory statements, however, are not sufficient to establish a genuine issue of material fact."); In re Sichert, 566 F.2d

1154, 1164, 196 USPQ 209, 217 (CCPA 1977)." See In re Dembiczak, 175 F. 3d 994 (Fed. Cir. 1999).

- "To prevent the use of hindsight based on the invention to defeat patentability of the invention, **this court requires the examiner to show a motivation to combine the references** that create the case of obviousness. In other words, **the examiner must show reasons** that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references **for combination in the manner claimed**." See In re Rouffet, 149, F.3d 1350 (Fed. Cir. 1998).

- The mere fact that references can be combined or modified does not render the resultant combination obvious **unless the prior art also suggests the desirability of the combination**. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, **there must be a suggestion or motivation in the reference** to do so." 916 F.2d at 682, 16 USPQ2d at 1432.). See also In re Fritch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992) (flexible landscape edging device which is conformable to a ground surface of varying slope not suggested by combination of prior art references).

- If the **proposed modification would render the prior art invention being modified unsatisfactory** for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

C. Brief Summary of the Present Invention

Prior to presenting substantive arguments in favor of the allowability of the claims on file, it might be desirable to summarize the present invention in view of the problem it addresses.

The present invention generally relates to training munitions for training military personnel. In particular, the present invention relates to a finless training projectile that develops spin in flight from radially angled slots in a slotted tail piece. *Reference is made to [0002], lines 1-4.*

Prior to the present training cartridge with a finless training projectile, the conventional finless projectile requires steadying rotation in both the launch barrel and after exit from the barrel. Furthermore, the conventional projectile does not provide a space in the cartridge for a low energy, economical propellant.

The conventional finless projectile has angled passages, grooves, or slots in both the nose and the rear flange stabilizer, with an interconnecting reduced diameter annulus in the projectile body. The presence of two groups of grooves in the nose and the rear results in an extended projectile length that does not provide for space in the cartridge to use low energy, economical propellant for the training projectile. Furthermore, the projectile spin in the launch barrel has to reverse spin direction outside the barrel as the angled grooves respond differently to nose incident air after exit from the barrel than to rear incident propellant gas inside the barrel. This spin reversal degrades the flight stability and target accuracy of the conventional projectile.

To this end, the present training cartridge and training projectile present improvements. In the present cartridge, a training cartridge 100 comprising a finless, ogival-nosed training projectile 10 is shown in FIG. 1. The training cartridge 100 comprises a canister 15 and a propellant 20. The projectile 10 comprises a body 25 and a tail 30. *Reference is made to [0015] lines 1-5.* The finless projectile provides for space for low energy, economical propellant. *Reference is made to [0008] lines 1-7.*

A nose is positioned at the forward front of the projectile. A stabilizer is positioned at the rear of the projectile. *Reference is made to [0016] lines 6-8.* The stabilizer ensures the projectile to spin after launch from a smooth

bore or non-rifled system as well as rifled cannons of various calibers, including 120 mm and 105 mm. *Reference is made to [0016] lines 5-6 and [0005] lines 4-5.* An obturator 220, fastened about the cylindrical portion of the projectile 10 provides a friction fit between the bore of the cannon and projectile 10 to prevent forward thrust gasses from escaping from the bore prior to the escape of the projectile 225 when fired. *Reference is made to [0016] lines 10-14.*

The nose has a shape that is ogive, cone or a combination of ogive and cone. *Reference is made to [0005] lines 1-2.* The slotted tail flange provides a ballistic match to tactical projectiles. *Reference is made to [0005] lines 8-9.* The finless projectile has a higher static margin than conventional spike-nosed training projectile. The projectile achieves greater flight stability and enhanced target accuracy by two improvements. The first improvement is the center of gravity has been moved more forward. The second improvement is the rearward center of pressure is at a constant position through the range of Mach numbers during flight. *Reference is made to [0007] lines 1-8 and [0025] lines 1-8.*

In the present finless projectile, spin torque and stability augmentation are provided by a radially angled slotted tail flange attached to the rear of the finless, nose-coned projectile. *Reference is made to [0005] lines 5-8.* The present finless projectile has a size that provides for space in the cartridge for less energetic, more economical propellant. *Reference is made to [0008] lines 1-7.*

D. Application of the Obviousness Standards

The **present cartridge** describes a finless projectile that includes a nose with increased mass and a slotted tail flange secured to the finless tail with a plurality of radially angled slots in the slotted tail flange. The tail comprises a generally cylindrical tail piece. The **slotted tail flange provides a space in a cartridge for housing the low energy, economical propellant**.

Russell generally describes a finless projectile that includes slots, alternatively called passages or grooves, in both the nose and the rear of the projectile for the expanding propellant gas to pass the angled slots in the rear and an annulus in the projectile body to reach the angled slots in the nose in order to induce spin in the projectile in a launch barrel in order to achieve steadying rotation. Due to the presence of the slots in both the nose and the rear, and an annulus in the projectile body connecting them, the projectile has a length that **does not provide for space in a cartridge for low energy, economical propellant**.

It would not be obvious for Russell to induce spin in the launch barrel with only a rear flange with angled slots. Russell generally describes that the propellant gas rushes past the rear flange with angled slots, alternatively called passages or grooves, past the reduced diameter annulus in the projectile body that allows the forward passage of propellant gas in the launch barrel, to reach the angled slots or grooves in the nose. Without the angled slots in the nose, the reduced diameter annulus in the projectile body allows too much propellant gas to expand forward without inducing sufficient spin in the launch barrel, resulting in inferior projectile stability and performance unsuitable for use.

Consequently, Russell does not produce the same or similar product or result as the present invention. Claim 1 and the claims dependent thereon, are thus not obvious in view of Russell.

In addition, the **present finless training projectile** discloses an ogive, cone, or a combination of ogive and cone shape nose with increased mass and a rear flange with angled slots. The present finless projectile maintains a higher static margin than the conventional spike-nose training projectile due to the following two improvements. The first being that **the center of gravity for the flight projectile has been moved further forward relative to the center of pressure**. The second improvement being that **the center of pressure remains in a constant rearward position, throughout the Mach number range encountered during flight**. This combination of physical features provides greater flight stability for enhanced target accuracy.

Russell is not capable of maintaining a higher static margin than the conventional spike-nose training projectile. Russell generally describes that the propellant gas rushes past the rear flange with angled slots, alternatively called passages or grooves, past the reduced diameter annulus in the projectile body that allows the forward passage of propellant gas in the launch barrel, to reach the angled slots or grooves in the nose. **Russell does not describe** a finless projectile with **a center of pressure that remains in a constant rearward position, so that a distance between the center of gravity and the center of pressure remains constant throughout the Mach number range encountered during flight**. Hence, Russell does not describe the combination of physical features that provides greater flight stability for enhanced target accuracy.

In fact, Russell teaches away from the present finless projectile. **Russell** generally describes **it is necessary to give the projectile its steadying rotation before it reaches and leaves the gun-muzzle**. Such rotation is secured by the action of the propelling-gases themselves upon portions of the projectile while the latter is in and is traveling through the guiding-bore of the gun and without the intervention of or aid of inclined grooves or rifling in the gun. The **projectile is provided with inclined faces situated well forward toward its front end and adapted to be reached and engaged by the gases passing forward along or around the sides of its rear portion or body**.

As the rear incident gases induce a rotation on the projectile while it is in the gun barrel, after the projectile leaves the muzzle, the front incident air induces rotation in the opposite direction and flips the sense of projectile rotation in the other direction because the **passages or grooves respond differently to front incident air as compared to rear incident air. This switch in the sense of projectile rotation after it leaves the muzzle and away from the constraint of the launch barrel introduces error in target accuracy**.

In contrast, **the projectile in the present invention starts spinning after leaving the muzzle or bore** and does not have this switch in projectile rotation. Hence, **Russell teaches away from the present finless projectile with regard to greater flight stability for enhanced target accuracy**.

McClain generally describes an **obturator** in finless projectile as the primary means for sealing gas and engaging rifling within a weapon tube. McClain **does not describe moving the center of gravity** of the projectile further forward, and **maintaining a stable center of pressure** behind the

center of gravity through the Mach number range encountered during flight to achieve greater stability for enhanced target accuracy.

The **hypothetical combination of Russell and McClain** would be a finless projectile that includes a nose with angled slots, passages or grooves, an annulus in the projectile body fitted with an obturator to prevent the loss of propellant gas from the launch barrel and a tail with a flange that includes angled slots. As the propellant gas is prevented to flow past the obturator, the gas does not induce spin in the launch barrel. Upon exit from the barrel, the oncoming air stream engages the slots, passages or grooves in the nose and the rear flange to spin the projectile.

Due to the presence of the slots in both the nose and the rear flange inducing spin from the front and rear of the projectile, the center of pressure of the projectile would be different from the center of pressure of only a rear flange with angled slots as in the present finless projectile.

Due to the presence of a nose with slots, a rear flange with slots, and a projectile body connecting the nose and rear of the projectile, the hypothetical combination of Russell and McClain has more complex and extended structure and consequently a center of gravity that is further behind the nose of the projectile.

Thus, the hypothetical combination of Russell and McClain does not yield the same or similar product as the present finless projectile in which **the center of gravity for the flight projectile has been moved further forward** and **the center of pressure remains in a constant rearward position, throughout the Mach number range encountered during flight**. This combination of physical features provides the present finless projectile

with greater flight stability for enhanced target accuracy.

In summary, neither Russell, McClain, nor the hypothetical combination of Russell and McClain produces the same or similar product as the present invention. Consequently, the claims on file are not obvious in view of the cited references of Russell and McClain, either individually or in combination with each other. Therefore claim 1 and the claims dependent thereon, are allowable.

CONCLUSION

All the claims presently on file in the present application are in condition for immediate allowance, and such action is respectfully requested. If it is felt for any reason that direct communication would serve to advance prosecution of this case to finality, the Examiner is invited to call the undersigned at the below-listed telephone number.

Respectfully submitted,

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